

Are Local Emergency Planning Committees Effective in Developing Community Disaster Preparedness?*

Michael K. Lindell

Department of Psychology
Michigan State University
East Lansing, MI 48824
and
Resources for the Future
Washington, DC 20036

Five years after SARA Title III set a deadline for communities to establish community emergency plans for releases of toxic chemicals, it appears that many—if not most—jurisdictions have failed to fully comply with the requirements of this legislation. However, there are a number of LEPCs that have made significant progress and, in this regard, SARA Title III compliance is quite comparable to that of other federal hazard mitigation and emergency preparedness programs. Moreover, the planning process mandated by this legislation does provide some significant improvements over previous methods of emergency preparedness. Some of the impediments to the effective performance of Local Emergency Planning Committees are identified and policy and implementation changes to overcome these obstacles are recommended.

The Emergency Planning and Community Right to Know Act (Title III of the Superfund Amendments and Reauthorization Act of 1986, or "SARA Title III") was passed by Congress in response to the potential for a catastrophic accident like the one that occurred at Bhopal. Among other requirements, SARA Title III mandated formation of Local Emergency Planning Committees (LEPCs) to plan for emergency response to catastrophic chemical releases. Individual LEPCs are comprised of public safety officers, planners, health care providers, environmental specialists, industry

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representatives, and others. LEPCs are responsible for preparing comprehensive emergency response plans and updating the plans annually. Each plan should be based upon hazard data submitted by facilities manufacturing, storing, transporting or utilizing extremely hazardous substances within the LEPC's community.

Unfortunately, full compliance with SARA Title III is a long way from being achieved. According to a recent study conducted by the National Governors' Association (Solyst and St. Amand 1991), 17 of the 56 states or territories reported that only part of their LEPCs had submitted the required emergency plans. Another 20 states or territories provided no information regarding LEPCs' submission of emergency plans, which strongly implies that few or none of their LEPCs are in compliance. Only 19 states or territories reported that all LEPCs within their jurisdiction had submitted plans to their State Emergency Response Commission (SERC). Moreover, the degree to which full compliance has been attained is questionable even in this latter group. It appears many of these LEPCs have submitted generic jurisdictional hazardous materials emergency response plans rather than developing site-specific emergency plans. In summary, SARA Title III compliance is substantially incomplete across the country and, in a number of cases, quite variable even within states.

These data on SARA Title III compliance levels raise a number of questions about the role of LEPCs in emergency preparedness. First, are LEPCs as currently implemented, an effective method of conducting emergency planning? Second, if LEPCs have not been effectively implemented, does the mandate imposed by current federal legislation have the potential to produce an effective method of conducting emergency planning? Third, if LEPCs do have a potential contribution to make, what are the impediments to effective implementation. Finally, if the current mandate is flawed or incomplete, what is needed to make LEPCs more effective?

The Actual Effectiveness of LEPCs As Currently Implemented

The most stringent standard for evaluation of LEPC effectiveness is full compliance with the requirements of SARA Title III, as the congressional mandate has been interpreted through federal guidance (e.g., National Response Team, 1987). Conclusions drawn from the National Governors' Association data reported by Solyst and St. Amand (1991) can be supplemented by data collected from Michigan LEPCs by Lindell and Meier (in press). The latter study examined the effectiveness of Michigan LEPCs' planning efforts in terms of three specific criteria. The first criterion was the development of site-specific emergency plans reviewed by the State

Emergency Response Commission (SERC). Review by the SERC is a meaningful measure of effectiveness because SERC staff use formalized criteria derived from disaster research, federal guidance and professional experience. In addition, LEPC effectiveness also was measured by the level of task progress in developing emergency plans and the quality of task performance. These intermediate steps can be assessed in terms of six major tasks: organizing and administering the LEPC, conducting vulnerability analyses, developing site-specific emergency plans, developing training programs for local emergency responders, conducting drills, and filing hazard data. The Michigan data show LEPC chairs judged that, on average, their LEPCs had completed 31% of the task of conducting hazard analyses, 26% of the task of developing site-specific emergency plans, and 15% of the task of training emergency responders. Moreover, they rated the quality of their LEPC's work (on a 1-5 scale, where 5 is very high quality) at 2.88 for organizing and administering the LEPC, 2.46 for conducting hazard analyses, 2.55 for developing site-specific plans, 1.71 for training emergency responders, 2.02 for conducting drills and exercises, and 2.64 for filing hazard data. Like the National Governors' Association data on SERCs, the Michigan LEPC data show evidence of considerable variation among jurisdictions. Michigan LEPC chairs' ratings of task completion ranged from 1% to 100% and task quality ratings likewise varied over the full range (1-5) of the rating scale for each of the six tasks listed there. This makes it clear some LEPCs have substantially completed tasks others have only just begun. Both task completion and task quality data indicate significant progress has been made, but much remains to be done before the congressional mandate has been fulfilled.

Comparing current achievements to the standard of full compliance with the congressional mandate is an important criterion, but it is not the only one. Another important standard of comparison is the level of effectiveness of programs for similar types of programs—in this case, programs of mitigation and preparedness for other environmental hazards. When compared to progress on earthquake, flood and hurricane programs, SARA Title III compliance levels are far less disappointing than they might first appear. Many studies have documented the painfully slow progress of state and local implementation of federal hazard mitigation and emergency preparedness policies (e.g., Berke, Beatley and Wilhite 1989; Drabek 1986; Drabek, Mushkatel and Kilijaneck 1983; May and Bolton 1986; May and Williams 1986).

One major barrier to the development of effective hazard management programs is the low priority communities and their elected officials assign to this activity. In a national survey of local officials, Rossi, Wright,

Weber-Burdin, Pietras and Diggins (1982) found environmental hazards were a low priority compared to the pressures of responding to other more immediate community problems. This finding has been elaborated by other investigators. Drabek, Mushkatel and Kilijanek (1983) reported only a small portion of emergency managers' time was spent on seismic safety issues even though they thought it was an important issue, while Wyner and Mann's case studies of seismic safety led them to characterize this issue in terms of "low visibility, incrementalism and low priority" (1983, p. 324). These findings are also consistent with Mileti's (1980) contention that hazard adjustment (including emergency planning) is adversely affected by perceptions of low risk resulting from lack of recent or frequent disaster experience and lack of access to credible hazard vulnerability analyses. Mileti's contention that community perceptions of high cost and lack of capacity to implement mitigation policies also impede disaster preparedness is amplified by Gillespie, Colignon, Banerjee, Murty and Rogge's (1993) characterization of the causes of one local jurisdiction's ineffectiveness as due to low funds, internal conflict, high turnover among staff, difficulties in carrying out day-to-day activities, unclear designation of responsibility, low priority for emergency management, and a low level of awareness concerning interorganizational relations for disaster preparedness.

The Potential Effectiveness of LEPCs As Currently Mandated

The fact that LEPC performance is significantly less than mandated, but probably at about the same level as other federal programs for environmental hazard management, leads to the next question—does the mandate imposed by current federal legislation have the potential to produce an effective method of conducting emergency planning? An affirmative answer to this question can be drawn from the fact that LEPCs provide a number of advantages over previous processes for emergency planning. First, past emergency planning often has been conducted on the basis of little or no information about local hazard vulnerability. By contrast, the SARA Title III provision for LEPC plans to be based upon hazard data submitted by facilities manufacturing, storing, transporting or utilizing extremely hazardous substances within its community is a significant improvement over past practices.

Second, although LEPCs are specifically charged with the responsibility for only a single hazard agent—toxic chemicals—they have the potential to illuminate issues associated with emergency planning for a wide range of environmental hazards. One important reason for this is that chemical hazards are less distinctive than they might appear. Toxic chemical emer-

gencies are quite variable with respect to impact characteristics such as speed of onset, amount of forewarning, scope and duration of impact and can initiate many of the same demands for emergency assessment, hazard mitigation, protective response, and emergency management that characterize a wide range of other hazard agents (Lindell and Perry 1992). Moreover, toxic chemical emergencies can be triggered by a variety of other types of hazards such as earthquakes, thus necessitating toxic chemical emergency planning as an integral component of preparedness for these other hazards (Association of Bay Area Governments 1990).

Third, past emergency plans were often developed by an isolated Civil Defense Director who assigned emergency task responsibilities to local agencies on the basis of little or no input from them. Once written, the plan was perfunctorily approved by elected officials and distributed to the bookshelves of the relevant local agencies where it gathered dust. By contrast, the SARA Title III planning process calls for emergency plans to be developed by teams comprised of public safety officers, planners, health care providers, environmental specialists, industry representatives. Other relevant contributors include representatives of schools, health facilities and environmental and community action groups. According to Hadden (1991), variety of membership within the LEPC provides an opportunity for disparate parties to work together over an extended period of time in a noncrisis atmosphere that promotes the development of mutual trust.

Thus, LEPCs are important because they represent a type of planning process that is likely to become increasingly important for all natural and technological hazards. LEPCs represent a rejection of the historical role of the isolated Civil Defense Director who sat in the basement of the courthouse and prepared emergency plans that were never read, much less implemented. LEPCs can play an important role in the community intermediate between that of the isolated local emergency services director and that of multi-jurisdictional planning consortia such as the Bay Area Regional Earthquake Preparedness Project, Central United States Earthquake Consortium and Southern California Earthquake Preparedness Project.

Other advantages of LEPCs have been noted by Feldman (1993), who suggested they can enhance the ability of communities to usefully build upon their disaster experience. This aspect of the planning process promotes the development of shared expectations about disaster demands (Kartez and Lindell 1987, 1990) and allows emergency organizations to achieve a mutually agreed upon definition of emergency response roles (Kreps 1978; Dynes 1978). This enhancement of interdepartmental, interjurisdictional, and public-sector/private-sector role clarity, together with the mobilization of networks of emergency planning resources (Drabek 1987; Dynes and

Quarantelli 1975; Gillespie, et al. 1993), promotes flexibility of organizational response to emergencies. Finally, LEPCs also can strengthen relationships among emergency responders by enhancing continuity between their everyday and emergency roles (cf. Stallings and Schepart 1987).

Impediments To Effective Implementation

One of the major impediments to effective implementation of community emergency planning for toxic chemical emergencies is the difference between national and local perspectives on the priority of environmental hazard management. This difference in perspectives can be illustrated by the fact that Sorensen's (1987) data indicate there are approximately 60 major chemical emergencies involving evacuation each year. Because these are divided over 5000 counties, each county's chance of a major chemical emergency is less than 1% per year. The effect of this "once in a century" risk may even be lower than it appears because the impact on local officials of this low expected frequency is further eroded by a non-uniform distribution of hazard vulnerability across jurisdictions. The variability in hazard vulnerability can be illustrated by data on Michigan communities' recent experience with evacuations and the number of chemical facilities in the community (cf. Gabor 1981; Gray 1981). According to Lindell and Whitney (in press), about half of the LEPCs reported having had an evacuation of any kind (not just involving chemical accidents) in the previous five years. Moreover, the average number of hazardous facilities reported by Michigan LEPCs was 20, but the range extended from 0 to 246. This substantial variation in hazard vulnerability means emergency preparedness is likely to have extremely low salience in many communities. In turn, the low salience of emergency preparedness makes local elected officials reluctant to allocate funds to the LEPC. Thus, LEPC members typically must perform their duties without release time, additional pay or staff support. Every hour spent on LEPC activities is taken from other professional or personal activities.

The low salience of emergency planning creates a number of other obstacles for LEPCs. They must adapt federal guidance (e.g., National Response Team 1987) in a way that provides them with a pattern of staffing and structure suited to their own limited resources. In many cases, this means LEPC members must train themselves in emergency planning at the same time as they are developing training for emergency responders. Lack of funding limits access to training and equipment, time available for planning, and access to paid staff and consultants. It also has an adverse impact on individual motivation to the degree that the most common

tangible rewards for good performance, salary increases and promotions, are unavailable. Indeed, financial limitations led the list of impediments recently reported by LEPC chairs. Lindell and Whitney (in press) found the most significant impediments, as indicated by LEPC chairs' ratings on a 1-5 scale, were lack of financial support (4.30) and concern about legal liability (3.41). Lack of commitment from officials (3.21), staffing problems such as turnover (3.04), and lack of training in HazMat planning (2.93) were significantly less important. Problems with lack of concern about vulnerability (2.81), lack of cooperation inside the LEPC (2.24), and lack of cooperation outside the LEPC (2.22) were quite small.

Policy and Implementation Changes to Enhance LEPC Effectiveness

As noted earlier, research on natural hazards management indicates similar problems have been encountered in connection with local implementation of federal earthquake, flood and hurricane mitigation and preparedness policies. Moreover, studies of disaster planning (Gillespie and Streeter 1987; Lindell and Perry 1992; Tierney 1980) have produced results quite consistent with conclusions drawn from research on processes influencing effectiveness in a wide range of organizations (Dyer 1984; Galbraith 1977; Gladstein 1984; Kopelman, Brief and Guzzo 1990; Sundstrom, DeMeuse and Futrell 1990). The latter studies make it clear organizational effectiveness is a function of factors external and internal to an organization. External factors include demands in the physical and social environment that dictate an organization's goals, as well as constraints and resources that influence an organization's motivation and ability to achieve its goals. The principal internal factors are an organization's human and technical resources used in performing its activities. Other internal factors include the structures and processes by which these resources are used to accomplish an organization's goals.

Taken together, this research suggests ways in which the effectiveness of LEPCs can be significantly increased. The first, and most obvious of these, is to obtaining secure funding. However, as will be discussed below, there are many reasons why a search for increased funding cannot be allowed to become the sole focus of LEPCs' efforts to achieve their goals. Thus, other methods of increasing LEPC effectiveness must be addressed. These include establishing a positive transfer of emergency planning resources from outside the community, enhancing support for emergency planning within the community, setting realistic priorities within the area of emergency planning, lowering the cost of emergency preparedness by reducing the workload associated with emergency planning, and enhancing

the LEPC's climate and its members' commitment to the organization. Achievement of these goals can be enhanced by establishing clear criteria for judging LEPC effectiveness.

Obtaining Secure Funding For Emergency Planning

Financial impediments to LEPC effectiveness can be addressed either directly—by means of formally established LEPC budgets, or indirectly—through in-kind contributions of goods and services. The most direct method of LEPC funding, from the general revenues of the jurisdiction, is sometimes resisted on the grounds that SARA Title III is just another unfunded federal mandate imposed upon local government. This claim is somewhat exaggerated because this legislation does little more than establish some additional legal mechanisms by which local government can take action on what is already its responsibility—protecting the health and safety of its citizens. In any event, complaining about unfunded mandates is not likely to prove fruitful because all levels of government face demands for services that are rising faster than tax revenues.

As an alternative to seeking funds from federal, state or local general funds, communities can support their LEPCs directly by establishing fees for processing industry reports (Tier 1, Tier 2, MSDS submissions) required by SARA Title III. Such fees are a fair method for charging back to industry a portion of the costs incurred by the community in adjusting to the chemical hazards it faces. Alternatively, such fees can be established by the state and channelled back to the local level. A particularly useful mechanism for allocation of state monies has been established in states where all LEPCs receive a base allocation, but incentives have been created for effective performance by providing additional funds for each plan accepted by the SERC, each drill or exercises conducted, and so forth.

Indirect funding from industry also has been a source that many communities have used to support their LEPCs. Industry representatives on LEPCs have assigned company personnel to perform analyses and conduct training of other LEPC members, as well as paying for outside technical assistance and picking up direct expenses (e.g., printing brochures). A potential problem with this method of funding is that the impact on the LEPC's planning effectiveness of its dependency on industry discretion is unknown. Consequently, research should be conducted to assess the prevalence of alternative funding methods and their consequences for LEPC effectiveness.

Transferring Emergency Planning Resources From Outside the Community

Emergency planning resources are available from a variety of sources at federal, state and regional levels. Although many specialized technical resources are available from many federal agencies, the complexity of the subjects covered and the time requirements involved in mastering them are substantial. The number of federal organizations involved in chemical emergency preparedness makes it difficult for SERC and LEPC personnel to understand what are the legal requirements imposed by each agency, who can help them and what help can be provided. The principal federal agencies—Environmental Protection Agency, Federal Emergency Management Agency, Occupational Safety and Health Administration and Department of Transportation—differ in their authority to impose regulatory requirements, and to provide technical guidance or funding support. LEPCs could become more effective if there were clarification and coordination of the technical expertise these agencies can provide for the principal tasks of the LEPC: organizing and administering the LEPC, conducting vulnerability analyses, developing site-specific emergency plans, developing training programs for local emergency responders, conducting drills, and filing hazard data.

Clarifying and simplifying the relationships among federal agencies is important because there are already significant differences among the types of emergency preparedness resources utilized by LEPCs. Lindell and Whitney (in press) found that four types of emergency planning resources (federal, state hazard assessment, state emergency planning, and regional LEPC association) had distinctly different patterns of correlations with other variables. This study also found the most effective LEPCs relied more on contacts with state emergency planners and the State LEPC Association than did less effective LEPCs. Thus, state sources, especially state government, appear to be needed to provide specific guidance and individualized technical assistance. Moreover, regional sources, such as neighboring jurisdictions, promote lateral diffusion by providing vicarious experience with disaster demands and by demonstrating the effectiveness of specific innovations including plans, procedures and equipment (cf. Kartez and Lindell 1987).

These results document the complexity of providing technical guidance to LEPCs and also our ignorance of the communication process governing the diffusion of information and adoption of disaster planning practices. Further research is needed to examine the similarities and differences among these types of emergency planning resources from the standpoint of

users at the LEPC. In particular, studies should be conducted to determine if there are ways in which the adoption of emergency planning practices differs from findings of previous studies on diffusion of innovations which also have shown the importance of lateral diffusion through peer influence processes (Rogers and Shoemaker 1971).

The limited information available regarding the influence of peer organizations on emergency preparedness suggests efforts should be made to enhance the effectiveness of peer exchange programs such as those provided by Chemical Manufacturers' Association, the International City/County Management Association, as well as through state LEPC Associations. It also suggests federal and state agencies should engage in "market segmentation" by working with a small number of LEPCs that have been carefully selected for variation on a number of relevant dimensions (e.g., level of hazard vulnerability, local resources, and current emergency preparedness). This does not rule out the possibility of direct contact between federal agencies and a broad range of LEPCs, but does suggest such contacts would be most effective if limited to carefully selected topics. These recommendations are consistent with the results of previous investigations indicating a need to avoid "top-down" approaches to emergency planning (Drabek 1987; May and Williams 1986). This is not to say federal efforts are unimportant; only that support from state agencies and networks of organizations representing multiple jurisdictions also are needed.

Developing Support Within the LEPC's Community

Community support can be thought of in terms of local resources provided and pressures applied to determine the direction of organizational action. Community support for SARA Title III issues could be enhanced by the increased participation of local environmental and community action groups in chemical emergency planning, increased salience of emergency preparedness within the general public—especially as this is stimulated by newsmedia coverage of SARA Title III activities—and direct appeals to local elected officials.

Community support also can be enhanced by extending membership on the LEPC to groups that are not routinely involved in emergency management. Lindell and Whitney's (in press) data from Michigan LEPCs indicate a high level of representation of emergency management (92%), fire department (98%) and law enforcement (96%). However, participation is lower for labor (35%), community groups (48%) and schools (50%). Little is known about why these groups are under-represented on LEPCs, but it is unlikely that citizen apathy is the problem. Lindell and Perry (1992, Table

9.6) have reported data showing approximately one-third of all citizens in the communities they surveyed were willing to volunteer time in support of local emergency preparedness. Thus, it seems more likely that citizens are deterred by their lack of knowledge of LEPC activities and perceived lack of emergency relevant knowledge. One way of broadening participation in LEPCs would be to engage in more active recruitment of LEPC members from such groups, identifying tasks to which they could make adequate contributions, and providing training materials that are suitable for them to accomplish these tasks. This process would involve only a simple extension of what already is being done with hazard vulnerability analyses. Although not specifically designed for a particular target group, the Technical Guidance for Hazard Analysis (US Environmental Protection Agency 1987) provides simple materials for computing vulnerable zones, a task that is typically not encountered in the daily duties of most LEPC members. Similarly, many types of analyses needed to assess the feasibility of evacuation and sheltering in-place are unfamiliar even to police and fire personnel. Thus, members of under-represented groups would start out being just as well qualified to conduct these analyses as would other LEPC members. If well designed training materials were provided along with well structured job performance aids, even novices at emergency planning could perform these tasks successfully (Dynes et al. 1972; James and James 1989; James and Sells 1981).

Local newsmedia have been reported to be underrepresented on LEPCs (Hadden 1989a), and this has been attributed to their concerns about the conflict of interest that might arise if they were members of an organization on which they would have to report in an emergency. It is unclear how widespread is the problem of newsmedia underrepresentation because Burkhart (1991) reported all Arizona LEPCs had been successful in recruiting newsmedia for their committees. More recently, Lindell and Whitney found 75% of Michigan LEPCs reported having newsmedia members, a level of participation comparable to elected officials (79%), hospitals and emergency medical services (85%), Red Cross (65%), public health (81%) and local industry (81%). Even if the Arizona and Michigan data are atypical of the country as a whole, low levels of newsmedia membership on LEPCs might nonetheless be unimportant if the critical organizational functions of newsmedia membership are accomplished. Burkhart (1991) identified five functions—performing public relations work for the LEPC, voting on LEPC policy, covering LEPC news, telling LEPCs how to inform the media, and attending LEPC meetings to learn about hazards—that varied in their degree of acceptability to members of the newsmedia. The two activities eliciting the most resistance from the newsmedia (performing

public relations work for the LEPC and voting on LEPC policy) could be performed by LEPC members who are knowledgeable about the workings of the newsmedia (e.g., public relations personnel, retired editors and reporters, journalism professors, etc.). The remaining activities (covering LEPC news, telling LEPCs how to inform the media, and attending LEPC meetings to learn about hazards) can be achieved by means of frequent contacts between the LEPC and the newsmedia regarding routine coverage of LEPC activities such as hazard and vulnerability analyses, development of plans, completion of training sessions, and performance of drills and exercises.

Routine dissemination of SARA Title III information through the newsmedia is important because most citizens prefer to receive emergency preparedness information by means of newspapers, radio, and television (Lindell and Perry 1992). The degree of reliance on each of the media varies from one community to another and, within each community, as a function of such social characteristics as socioeconomic status and ethnicity. Local radio is particularly useful in many communities because it is a high-coverage, low cost communication channel that is readily available to emergency managers. LEPC members can engage in a community dialogue by participating in "call-in" programs designed to solicit questions from listeners. Even brief public service announcements can be used effectively to raise the salience of chemical hazards and advise interested listeners how to obtain additional information (e.g., by calling the local emergency services office or visiting their local library to obtain a brochure).

Community support also can be increased by face to face contacts with community organizations during their routine meetings and through special neighborhood meetings with residents of vulnerable zones. Such meetings can be used to explain what are the chemical hazards to which the community is vulnerable and what the LEPC is in the process of doing about them. *Ad hoc* meetings are substantially less preferred by the public at large (Lindell and Perry 1992), but involvement of existing community organizations is likely to be effective. Community-wide business, social, and service organizations are important, but neighborhood homeowners' associations and "Blockwatch" groups also should be addressed (Kartez 1982; Kartez and Kelley 1988).

SARA Title III appears to have been quite successful in obtaining the chemical industry's support for local emergency preparedness. As the Michigan data presented earlier indicate, most LEPCs do have industry representation on the LEPC and, in many cases, industry representatives are providing significant amounts of indirect funding for LEPC activities. Nonetheless, the chemical industry's support to LEPCs is not without

problems. Specifically, the Michigan LEPC data indicate representation on LEPCs is significantly more likely to come from fixed facilities (81%) than shippers and carriers of hazardous materials transported through the community (17%). This means transportation accidents are less likely to receive attention and, even then, less amenable to the level of coordinated planning that is possible when a representative is present on the LEPC. Federal agencies and chemical industry groups could overcome this problem by establishing uniform HazMat carrier response capability requirements (such as maximum response times for personnel and equipment to any point along a transportation route, cf. Hancock, Abkowitz and Lepofsky (1993) and promoting the dissemination of this information to LEPCs for use in their planning efforts.

The need for obtaining support from senior elected and appointed officials in the community is widely recognized, but the ways in which effective "issue selling" can be conducted are less well known. Dutton and Ashford (1993) recently noted that the shortage of time and attention by top management is a fact of life in all organizations, and that middle managers must successfully contend with this if their organizations are to be effective. As applied to SARA Title III, this means LEPC members must fulfill the role of middle managers who identify chemical emergency preparedness as an issue, diagnose hazard vulnerability as a critical problem, and propose emergency planning as an effective solution. To be successful, they must effectively package the issue and manage the selling process in order to maximize management attention while maintaining credibility for future selling attempts. The propositions outlined in Dutton and Ashford's (1993) review suggest chemical emergency preparedness is more likely to receive attention if it is "packaged" as

- having significant consequences for local residents,
- within the competence of local emergency planners to implement,
- amenable to solution if significant resources are allocated to the problem,
- contributing to the solution of problems associated with the management of a variety of natural and technological hazards, and
- a local responsibility rather than an "unfunded federal mandate" arbitrarily imposed from outside the community.

LEPC effectiveness could be enhanced if methods of mobilizing community support for chemical emergency preparedness were better understood and disseminated to LEPC members. Drabek (1987) has identified structures and strategies emergency managers can use to enhance the

success of their efforts, but this work is far from complete, let alone achieving widespread adoption by emergency planning practitioners.

Reducing the Workload Associated With Emergency Planning

A common problem facing LEPCs is inundation by Material Safety Data Sheets (MSDSs) from local industry (Hadden 1989b). Although MSDSs contain essential information needed by firefighters and medical personnel, a major impediment to processing this information is the variation in MSDS forms from one source to another. Some local officials have reported receiving boxes of MSDSs that are immediately stored in closets without being read. A significant contribution to the effectiveness of LEPCs would therefore be to standardize MSDS forms (Kozlowski and Doherty 1989).

Another problem is the lack of experience many local jurisdictions have in preparing emergency plans. This has led to substantial variation in the degree of specificity for the guidance SERCs give to LEPCs in emergency planning (Solyst and St. Amand, 1993). Some states provide only broad guidelines in order to maintain their LEPCs' autonomy and promote creative solutions to problems of emergency planning. Other states are concerned that local jurisdictions will be paralyzed by a lack of knowledge of where to begin and, therefore, are quite prescriptive about the content of emergency plans. In extreme cases, this can result in "fill-in-the-blanks" plans. Defenders of the practice contend local emergency planners become extremely frustrated trying to develop plans from scratch and are better off copying from a plan developed by experts rather than from a plan developed by another jurisdiction that may be even less knowledgeable about emergency planning. Opponents of this practice contend these plans provide a "one-size-fits-none" solution to the problem of guiding a community's unique organizational structure and capabilities in responding to an emergency. Given the lack of resolution on this issue, systematic study is warranted in order to provide SERCs with guidelines on the consequences of pursuing alternative courses of action.

Setting Priorities For Emergency Planning

The low priority of emergency management makes it critical to set effective priorities. Unfortunately, lack of knowledge makes it difficult to set priorities appropriately. One way in which priorities can be examined is to compare the attention and resources given to each of four basic emergency response functions—emergency assessment, hazard mitigation, protective response, and emergency management.

It appears that most communities give higher priority to the first two functions than to the remaining two. One possible explanation for this imbalance in priorities is the informal power of local industry and fire departments that is derived from these members' specialized knowledge about chemical hazards, spill control and remediation. As noted earlier, this "expert power" can be intimidating to local environmental and community groups and, as Faupel and Bailey (1988) have observed, to local officials as well. Even when the hazardous materials specialists do not intentionally intimidate others, their perceived expertise is likely to result in a predominantly technological definition of emergency preparedness. This technological focus restricts attention to only a few of the generic emergency response functions identified by Lindell and Perry (1992, Table 3.1). Thus considerable attention is given to threat detection, hazard monitoring, mobilization of emergency facilities and equipment, and hazard source control ("patching and plugging"), while protective action selection, population warning, and emergency public information are erroneously treated as nonproblematic. In particular, the complexity of protective action implementation (especially evacuation of schools, nursing homes, hospitals and jails, and estimation of the efficacy of sheltering in-place) typically is not recognized (cf. Lindell and Ogren 1992).

As a consequence of these priorities, many jurisdictions have focussed on the development of response teams whose training and equipment qualify them to perform these tasks, and assessing reaction times for hazardous materials response teams (cf. Hancock, Abkowitz and Lepofsky 1993) and developing their own teams or to signing agreements with other jurisdictions that do have HazMat teams. In many cases, jurisdictions would be better served by establishing a hazardous materials support team that could assist a fully trained and equipped hazardous materials entry team responding from another jurisdiction in accordance with a Mutual Aid agreement or one that is under contract to the facility operator, or hazardous material shipper or carrier. Guidelines should be developed that identify levels of HazMat team capability and alternative mechanisms for structuring Mutual Aid agreements.

The technological focus of chemical emergency preparedness could be redressed if federal and state agencies were to set the agenda for LEPCs in this area. Publication of more comprehensive guidance on conducting analyses and preparing procedures for protective action decisionmaking would be helpful in this regard. Although the need for protective action recommendations for the public is recognized in many publications in emergency planning, local emergency responders are given little guidance about how to choose between evacuation and sheltering in-place during a

hazardous materials emergency, how to plan for a major evacuation, and how to assess the vulnerability of local structures to air infiltration. Consequently, the problem of protective action assessment is one in which local emergency planners typically underestimate their lack of knowledge. In other words, they don't know how little they know about the problem. LEPCs would benefit considerably from technical guidance in conducting sheltering and evacuation assessments for the general public and special facilities (e.g., schools, hospitals, and nursing homes, see Lindell and Perry, 1992) in their communities.

Guidance also could be provided regarding ways in which LEPCs could enhance local emergency preparedness by supporting protective action decisionmaking and implementation. One particularly useful measure would be to conduct analyses examining the feasibility of this protective action for the public or for special populations in the vulnerable zone. Guidance could be developed for conducting surveys of special facilities and residences in vulnerable zones to assess their air infiltration rates. Such a survey could provide basic information permitting emergency managers to determine if in-place protection is a feasible protective action for the types and quantities of materials that could be released in their communities.

In the event that local structures were insufficiently airtight, cooperative programs could be established with the local power utilities to upgrade the weathersealing of these structures. The vulnerable population would benefit from such programs in two ways. First, decreasing air infiltration rates would provide increased protection in a hazardous materials release. Second, decreasing air infiltration rates would also decrease monthly energy consumption, thus providing a direct economic return to community residents. Costs to local residents for the upgrade could be established on a sliding scale inversely proportional to distance from a hazardous facility. Residents living farther away (say, between one-half and two miles from a facility) could be charged the cost of materials and labor, while residents closer (within one-half mile, for example) might be charged less than cost, with the difference paid by the operator of the facility. This would provide compensation to local residents for the increased risk they bear for living close to the facility.

Enhancing the LEPC's Climate and Members' Commitment

When external funding is unavailable, LEPCs must achieve their goals by becoming more efficient in conducting LEPC business, conducting LEPC business on time that was allocated to other professional activities, and inducing members to contribute their own personal time to the LEPC.

One way in which LEPCs can achieve increased efficiency is through appropriate staffing and organization. Although the staffing and organization of LEPCs has been addressed to some extent by federal guidance, this topic should be examined more fully in light of the documented importance of organizational structure, member inputs, and technology as influences on group performance (Galbraith 1977; Gladstein 1984). Lindell and Whitney (in press) recently found LEPCs are more effective when they score high on an indicator of staffing and structure that included measures of the range and effective use of knowledge, skills and abilities in the LEPC (i.e., the total number of agencies represented on the LEPC) and whether the LEPC had organized subcommittees. Other measures include the availability of automated technology (e.g., computer hardware and software for accessing databases and conducting hazard vulnerability analyses), and member inputs (e.g., number of members, availability of paid staff, length and frequency of meetings, and levels of effort, absenteeism and turnover by LEPC members).

Lindell and Whitney also found team climate—members' interpretations of features, events and processes that take place in the work environment (James, James and Ashe 1990)—was important, presumably because it influences work motivation. To the degree that individual motivation is aroused, maintained, and directed toward the group goal, individual behavior will result in satisfactory team performance (Steers and Porter 1987). Team climate also is important because it is related to job satisfaction and organizational commitment which, in turn, are related to attachment behaviors (absenteeism and turnover) that can affect group performance indirectly (Mobley 1977). Moreover, job satisfaction is consistently related to citizenship behaviors which involve expenditure of effort above and beyond the minimum level required for role performance (Kopelman, Brief and Guzzo 1990).

Team climate is especially relevant to LEPCs because the absence of external funding for SARA Title III planning requires many communities to rely on voluntary contributions of time by individuals who already have full time jobs. These time demands lead to role stress, especially role conflict and role overload. Time is likely to be taken from LEPC members' normal jobs and family obligations and allotted to SARA Title III planning activities only to the extent that there are either intrinsic or extrinsic rewards for emergency planning activities. Team members are likely to regard LEPC activities as intrinsically rewarding if they perceive their tasks as intellectually challenging and lead to the development of valued skills (job challenge). Intrinsic rewards can also arise from the belief that performance of these LEPC tasks will result in a significant reduction in the vulnerability

of their community to chemical hazards (task significance). Also related to intrinsic reward is the development of a clear understanding of the allocation of authority and responsibility within the team (role clarity), a spirit of honest communication and willingness to provide assistance (workgroup cooperation), and believing the LEPC is doing its job effectively (team pride). Extrinsic rewards would come from responding to concerns about chemical hazards expressed by elected officials who establish a clear sense of the importance of emergency planning to them (leader goal emphasis) and who also monitor and acknowledge the progress of the team's progress (leader support).

Many of these climate dimensions are associated with LEPC members' organizational commitment—which is their identification with the organization and desire to remain a member (Mathieu and Zajac 1990). A recent study by Whitney (1993) has shown factors affecting organizational members' commitment in previous research also are relevant to LEPCs. Effective LEPC leadership (the ability to structure team tasks, to communicate clearly and to show consideration for team members) and the LEPC members' perceptions of their own competence (job related self-efficacy) both affected commitment. Other factors affecting commitment included the members' identification with the LEPC's goals (perceived hazard vulnerability and perceived effectiveness of emergency planning), and perceived opportunity for reward (public recognition and personal skill development). In turn, LEPC members' organizational commitment was correlated with their attachment behaviors (attendance, effort, and continued membership in the organization).

Defining and Monitoring LEPC Effectiveness

Measures of LEPC effectiveness are important because it is a fundamental principle of personnel management that monitoring and appraisal of performance is essential in ensuring workers' activities are consistent with organizational goals. Most textbooks on management (e.g., Koontz and O'Donnell 1972), personnel (e.g., Cascio 1991) and industrial/organizational psychology (e.g., Muchinsky 1993) assert managers should explain to subordinates what is expected of them, work with them to set performance goals, provide guidance regarding methods by which the goals can be achieved, systematically monitor performance, and conduct periodic evaluations rewarding good performance, correcting errors, and punishing negligent behavior.

One of the thorniest issues in the development of adequate measures of LEPC performance stems from the fact that emergencies are infrequent and

thus the opportunity to evaluate response to actual emergencies is rare. This is compounded by the problem of causal ambiguity—an accident involving a very rapid release of a large quantity of highly toxic chemical in a densely populated area is almost certain to produce a large loss of life, no matter how good the emergency plan. Conversely, even a poorly designed plan might be adequate if there were a slow release, small quantity, innocuous chemical, or unpopulated area (Lindell and Perry 1980).

Gillespie and his colleagues' (Gillespie, et al. 1993; Gillespie and Streeter 1987) examination of the issue shows that satisfactory assessments of emergency preparedness can be obtained indirectly from the existence of disaster plans, interorganizational relations, disaster-relevant training and exercises, and public education. Similar variables have been used by Kartez and Lindell (1987, 1990) as indicators of an effective planning process, while the development of disaster plans, training, and exercises have been used as criteria of LEPC effectiveness (Lindell and Meier in press; Lindell and Whitney in press) because they are specifically defined by federal guidance as activities that lead to the development of effective emergency plans (National Response Team 1987). The emphasis by Gillespie and his colleagues (1993) on the creation and maintenance of interorganizational relations through routine scheduling of meetings at times convenient for all members, adherence to published agendas, and concentration on common interests is consistent with Solyst and St. Amand's (1993) assessment of SERC effectiveness in terms of a legal basis, regularly scheduled meetings, permanent staff, functional subcommittees, and production of services and products.

Many of the problems in using emergency plans as a surrogate of emergency preparedness can be overcome by using supplementary measures. This does not completely solve the problem because some of the criteria, such as task quality and percent of task completion (cf. Lindell and Meier, in press; Lindell and Whitney, in press) involve subjective judgments that might be either deliberately or unintentionally distorted in order to appear more competent to outside observers. This problem of distortion might be more apparent than real given Lindell and Whitney's (in press) finding that subjective criteria led to the same conclusions as the objective criterion of emergency plan completion but, this is an issue deserving greater scrutiny.

A further complication is the difficulty in evaluating emergency plans given the increasing tendency to remove specific details from the emergency plan and place them in emergency procedures or maintain them on file as appendices to the functional annexes of the emergency plan. One way of dealing with this problem of assessing emergency preparedness is for

SERCs to conduct onsite audits that examine the accessibility of supporting documents and emergency response equipment. Another is for the LEPC to test the mobilization times competence of trained personnel in tabletop exercises and walkthrough drills.

Conclusions

The studies reviewed here indicate many—if not most—jurisdictions have failed to fully comply with the requirements of this legislation. However, there are a number of LEPCs that have made significant progress and, in this regard, SARA Title III compliance seems quite comparable to that of other federal hazard mitigation and emergency preparedness programs. Moreover, the planning process mandated by this legislation does provide some significant improvements over previous methods of emergency preparedness.

In addition, these studies have some very important practical consequences for the design and operation of LEPCs. Specifically, it appears that addressing LEPC staffing and organization, team climate, and LEPC member commitment are as important to its effectiveness as tasks such as developing HazMat teams, conducting hazard and vulnerability analyses, identifying emergency response resources, and analyzing evacuation routes, yet LEPCs are currently left to their own devices with regard to development of effective group processes. As noted earlier, Drabek (1987) has begun to address structures and strategies by which emergency managers can enhance the success of their efforts, but this work is far from widespread adoption by emergency planning practitioners.

LEPC leaders can enhance team climate and member commitment by translating overall LEPC goals into specific, challenging objectives for subcommittees and individuals. In addition, they can provide paths to success by allocating tasks that utilize members' existing skills and abilities, and giving feedback by paying attention and responding to members' task performance. They also can provide rewards by emphasizing the effect of task performance on community protection, publicly recognizing effective performance, and identifying opportunities for members' skill development.

Overall, there is wide variation among the LEPCs in the extent to which they have established a positive, supportive climate and few, if any, could not significantly improve their climate. A major challenge for LEPCs is to recognize the importance of these human resource issues and place as much emphasis on organizational development as on technical training and equipment acquisition.

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